AETC News Clips
Randolph AFB, Texas

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Military appreciates S.A.

I have been overwhelmed by the wonderful support San Antonio provides to all the military members stationed here. This was never more apparent than in the show of support San Antonio and the surrounding communities provided us during the recent Celebrate America's Military Week activities sponsored by the Greater San Antonio Chamber of Commerce.

The range of events, including dinners, parades, a visit to the zoo and more, was tremendous. I had the opportunity, along with many hundreds of other service members, to watch the world champion Spurs work their magic on the Atlanta Hawks at their Military Appreciation Night. The evening I spent with the San Antonio Symphony was a memorable highlight as thousands of military members and supporters enjoyed the beautiful patriotic music played by these talented and gifted musicians.

The military men and women in San Antonio are proud to be a part of this community and eagerly participated in the many events that highlight the reciprocal support between San Antonio and the military.

To everyone in San Antonio and the communities around, please accept my heartfelt thanks for all you do every day to support and encourage the soldiers, sailors, Marines and airmen assigned or training here. We truly appreciate you.

—Gen. William R. Looney III, commander, Air Education and Training Command

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Simulator Eases Night-Vision Goggle Dangers

By Michael Peck

In the surreal world of amplified light, things aren't as they appear. That's why a new simulator for fighter pilots will ease the dangers of training with night-vision goggles.

Instructors said the simulator will enable them to teach pilots on the ground, in an environment where violating safety procedures doesn't have such profound consequences.

"It's totally a safety issue," said Maj. Jonathan Beasley, an instructor pilot with the 56th Training Squadron at Luke Air Force Base, Ariz. "If you look at all the mishaps we've had in fighters using goggles, almost all of them were caused by reliance on some type of visual cue that you're not supposed to be relying on with night-vision devices."

During the initial few rides, pilots often are uncomfortable and disoriented, noted Maj. Jeff Johnson, an instructor pilot with the 310th Fighter Squadron. "It's a different perception that messes with their equilibrium."

Currently undergoing testing at Luke, the night-vision goggle simulator is fitted to existing F-16 flight simulators. It consists of goggles, software, a connecting cable to the flight simulator and cranial movement tracker to record a pilot's helmet motion and to present the proper visual cues. The simulator goggles have the same weight and feel as their cockpit counterparts.

The system is designed to work with all three F-16 flight simulators used at Luke, including the unit training device, re-hosted weapons system trainer, and the networked training center.

The simulator does a good job of visualizing the night sky, asserted Beasley, who also serves as program manager for the networked training center. "If you flip the goggles up and take a look around, it's just as if you were flying around at night, as a typical basic course student does before he goes into night-vision goggles training."

The system is aimed at students who are taking their initial night vision training. During the three to four week course, students fly five training sorties where they practice night formation flying as wingmen. Previously, there was

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only one night vision simulator—a simple system that only taught them how to don and remove goggles in a dark cockpit.

But actually flying with goggles is an acquired habit. Their most dangerous idiosyncrasies are a lack of peripheral vision and a circular field of view that is limited to only 40 degrees. “You don’t have any depth perception,” said Beasley. “A light three miles away and a light 50 miles away looks the same through goggles. It’s harder to fly formation and figure out how far away you are from the other planes.”

Those visual miscues mean pilots must be taught to rely on instrument crosscheck, which mandates constantly scanning their instruments and trusting the data even when their senses tell them otherwise. Johnson, who has used the simulator extensively, said the system greatly helps teach this vital skill.

“What it does best is take away your peripheral vision,” Johnson said. “Normally, in the daytime, your peripheral vision sees the horizon and it automatically knows which way is up. When you put the goggles on, it takes that away. Now it’s like you’re looking through a soda straw. And to take all that information into your brain, you have to move your head around quite a bit. It takes students a few rides to get the hang of it.”

Night-vision flight trainees must have a safety pilot with them in case they get disoriented during flight. The simulator enables them to practice more safely and cheaply. “The biggest benefit of the sim is to develop that instrument cross check on the ground when you’re not burning time and gas,” Johnson said. “When you get the student in the air, his cross check is a lot more efficient.”

Proficiency in using night-vision goggles is no luxury. They have become a routine part of night flights, used during most operations except for take off, landing and aerial refueling. Fortunately, the simulator can accommodate both air-to-air and air-to-ground training. “You can get guys in your [simulated] radar scope,” Beasley said. “As you get closer, you can start to see them through the goggles in the simulator.”

Beasley said the simulator could actually do a few things that real flight training can’t. For example, students in a real night flight will only have a chance to experience using goggles with whatever phase the moon is in that week. The simulator allows instructors to vary the moonlight.

The instructors make clear that simulator training is no substitute for actual flight time with a pair of goggles over your eyes. The simulator isn’t a perfect imitation. It doesn’t fully reflect the motion of actual flight. Nor does it show the dense air traffic of airliners and small aircraft that are encountered in real airspace.

Perhaps the biggest flaw is that it lacks the processing power to perfectly simulate lighting for goggles that magnify light 8,000 times. “It would take a huge amount of processing power to show that and the shadowing effects 100

percent," Beasley said. But perfection isn't needed. The simulator just needs to be good enough to instill students with the proper procedures for using night vision devices, added Beasley.

The simulator's 2-D graphics and 3-D imagery are powered by Onyx computers from Silicon Graphics. The computers create effects that are reflective (terrain illuminated by moonlight and starlight), emissive (lights, flares and explosions) and 2-D head-up display graphics as seen through goggles, said Brad Morrow, a Silicon Graphics account manager. These three outputs are blended by SensorHost postprocessors from the Air Force Research Lab, which adjusts their relative brightness and also the overall brightness of the scene.

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Air Force Revisiting Requirements for Pilot Training

By Sandra I. Erwin

Senior U.S. Air Force officials are debating whether a planned drawdown of the service's aircraft fleet should be matched by cutbacks to the number of pilots that are recruited and trained.

At a gathering of three-star and four-star Air Force generals scheduled for December, one of the topics of discussion will be the possibility of slowing down the entry of new aviators into the force.

The Air Force currently trains about 1,100 pilots each year. That is more than double the number of pilots the Air Force had in its ranks in the early 1990s.

At the December meeting, known as a "rated summit," Air Force leaders will discuss, among other topics, the service's long-term requirements for combat aviators, said Gen. William R. Looney III, who heads the Air Education and Training Command. "The number of required trained pilots may change," he said in an interview. "Now we produce 1,100 pilots a year. The question is, 'Is it the right number?'"

Inventory reductions of potentially more than 700 aircraft planned for the next five years could lead to a reduction of the pilot force, although no firm decisions have been made, he said.

"We'll look at the future, the amount of aircraft we expect to have, the number of pilots we need, how many we need to train," Looney said.

Regardless of the outcome of these deliberations, no sweeping reductions are expected right away, he cautioned. The draconian cuts seen immediately after the end of the Cold War, when the force dropped precipitously, were too disruptive and led to low morale in the ranks, Looney explained. "We don't want to go through that same major drastic cut, because of the unintended consequences it has on the force."

Pilot training is one of several areas that the Air Force is reevaluating. Aviators, said Looney, can expect to see gradual changes to their training regime. More of their training, for example, will shift from real airplanes to simulators.

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"Simulation is a huge multiplier, and enhances our training capability," Looney said.

C-17 and C-130J cargo aircraft operators, much like commercial airline pilots, will do almost their entire training on simulators. The first time they will board a real cockpit will be for their "check ride," a pilot proficiency sortie.

Pilots complete their initial qualification in simulators known as "weapon system trainers."

This does not apply, however, to older C-130s, which do not have the sophisticated simulators available for the J fleet, explained Air Force spokesman Dave Smith.

The C-130E trainers are "not as good" as the C-17's and C-130J's, Smith said, although the E simulators are receiving some upgrades to allow landing training. Once the enhancements are completed, the Air Force will determine whether pilots can receive their initial qualification checks in the weapon system trainer, said Smith, although he admitted this was an ambitious goal. One major drawback in the C-130E simulator is the poor fidelity of the landing simulations. "The C-130E does not have a heads-up display, and its systems make learning how to land the aircraft more difficult than the C-17 or C-130J."

Simulators are categorized on a scale from A-D, the highest being a level D. In a level D simulator, a pilot can earn a rating without ever having to fly the aircraft. The C-130E has level C simulators, according to the contractor, Lockheed Martin.

The Air Education and Training Command, and the Air Mobility Command are preparing a "request for proposals" from Lockheed Martin to begin the simulator upgrades, and to develop a new syllabus and training program by April 2007.

According to Lockheed spokesman Warren Wright, "there are some discussions being held about further upgrades for the E models, but no RFP or formal proposals have been issued."

The shift to simulator-based training seen in the Air Force mirrors a trend that started in commercial aviation many years ago, experts noted.

"We are seeing a convergence between what the military customers are asking for and the commercial sector," said Hugh Dunkley, vice president of simulation programs for CAE USA.

Current military operations limit the number of aircraft available for training, which translates into a higher demand for simulators, Dunkley said. "What was safety and economics driven in the commercial sector is now seen as an effective means of freeing up aircraft for deployable use."

In commercial aviation, the most advanced simulators are classified as "zero flight time" trainers where literally the commercial pilot will fly the real aircraft for the first time with passengers onboard, Dunkley said. Military transport

trainees not only must learn how to operate and fly the airplane, but also must master unique maneuver skills, such as dropping cargo loads, lining up in formations, air-to-air refueling and other tasks. “That requires high fidelity simulations,” said Dunkley.

Air Force aviators, meanwhile, will continue to see their career field affected by the expansion of the service’s unmanned aircraft fleet.

All UAV operators in the Air Force today must be rated pilots. “They have to understand the rules of the airspace,” said Looney.

That policy may be reevaluated some day, he said. “We may develop a program for UAV operators who are not rated pilots.” The key question will be whether non-rated UAV operators will be able to operate with the same level of proficiency as a rated pilot. “If we can do that, it would make sense to head down that road,” Looney said. The Air Force trains all UAV operators at Creech Air Force Base, Nev.

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Pilot honored for courage under pressure

By Ed Offley News Herald Writer 747-5079 / eoffley@pcnh.com

TYNDALL AIR FORCE BASE

For a fighter pilot, it doesn't get any better than this.

Capt. Clayton Bartels was perched in the cockpit of an F/A-22 Raptor high over the Gulf of Mexico. The mission was what pilots term a "fourship" — two pairs of Raptors engaged in mock air combat maneuvers against one another.

The 31-year-old Air Force Academy graduate was a newcomer to the Raptor training program, but not to fighters. A 1996 grad from Colorado Springs, Colo., Bartels had more than 1,300 hours in his flight logbook and had served two tours as an F-15 instructor pilot. He was going through the three-month "check-up" syllabus at the 43rd Fighter Squadron here to qualify as a Raptor instructor pilot himself.

It was May 11, 2005, and this was his first night flight in the F/A-22.

The four fighters were operating down in the W-470 training range, a 7,835-square-mile rhomboid-shape airspace that fills most of the Gulf of Mexico in the state's big bend offshore from Apalachicola and Apalachee Bay down toward Tampa Bay.

Bartels was at 38,000 feet, his throttles set to supercruise and humming along at about 850 mph — a capability unique to the Raptor in which it can fly in supersonic flight without having to use its engine afterburners.

Peering through the Raptor's canopy with his nightvision goggles, Bartels could clearly see the lights of St. Petersburg and Tampa off to the east. Far below, a scattering of clouds at 5,000 feet were the only visual obstacles on a brilliantly clear spring night.

Then the fun suddenly stopped.

Flying blind

The emergency began with a bright light on his cockpit display. The master warning light suddenly illuminated, then a prerecorded audio message sounded in his helmet receiver: an electrical bus malfunction had occurred because (it was later learned) a credit cardsized circuit board inside the Raptor had shorted out.

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One of the distinctive characteristics of the F/A-22 that sets it apart from older fighters such as the F-15 and F-16 is the amount of computing power and integrated electronics contained within the 62-foot fuselage.

An Air Force factsheet on the Raptor notes: "The F/A-22's avionics suite features extensive use of very highspeed integrated circuit technology, common modules, and high-speed data buses. … Technologies incorporated in the F-22 include a Common Integrated Processor, a central 'brain' with the equivalent computing throughput of two Cray supercomputers … " that have 800 megabytes of memory and can process 10.5 billion instructions per second.

In contrast, the lunar lander vehicle that set two astronauts on the moon in 1969 had only 37 kilobytes of memory and operated at 100,000 instructions per second.

Bartels recalled this week that he had no time to reflect on why the malfunction had happened or to ponder the prospect of possibly having to eject. "I was more concerned with getting home safely," he said.

The pilot thumbed his radio microphone button and issued a blunt order: "I said, 'Knock it off' on the radio to my wingman and the other two Raptors," he said.

He heard an acknowledgement, but then the electrical failure spread through his navigation and communications systems.

What had failed was one of four 270-volt electrical buses in the Raptor's internal power system, which route AC and DC electricity from a generator to various components. While the other three electrical buses were able to take up some of the load, Bartels said he realized the Raptor had lost most of its advanced navigating devices, including a visual cockpit display showing the course and precise location determined by Global Positioning System satellites.

His exterior anti-collision lights were dead, although a separate set of "formation lights" on the wingtips, tail and nose continued to work. His radio was out. When he activated a backup system, he could only receive transmissions.

It was, Air Force officials say, the most serious in-flight mishap to occur to the fleet of 23 Raptors at Tyndall in the program's two-year history.

Did he feel in physical danger? The pilot shook his head emphatically.

"It was not uncomfortable," Bartels recalled. "I knew my altitude, bank angle and heading. It was easy to maintain orientation."

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Following a standard safety procedure established in the preflight mission briefing, Bartels headed to his "last known point" within the W-470 range. Still capable of hearing fellow pilots, Bartels after five minutes realized they were aware his aircraft had suffered an unknown malfunction and were looking for him. Finally, fellow pilot Capt. Shawn Anger came up on his right wing.

"We couldn't talk," Bartels said. He tried flashing his wingman with a flashlight but it didn't work.

On the radio, Anger asked Bartels, "Do you have a problem. Flash once if yes, twice if no."

Bartels blinked his formation lights once in reply.

The four fighters turned north and made an uneventful return to Tyndall, where Bartels made his first night landing, without lights. Learning curve

For Lt. Col. Craig Hall, deputy commander of the 325th Maintenance Group at Tyndall, the mishap was all but inevitable given the complexity of the F/A-22 and the normal "learning curve" that pilots and maintenance technicians must go through in any new aircraft system.

"We have on average 10 (F/A-22) sorties per day at Tyndall," Hall said. "There will usually be three or four avionics discrepancies. This is not a trend that we are concerned about. This is the flying business."

Bartels agreed. "This jet is all about computers," he said. "You never have one simple problem. … (The onboard computer) does a lot of things for you that you would have to do for yourself in an older plane."

A post-mishap investigation quickly identified the circuit board that had failed, Hall said. And they also learned something about the Raptor's system that was not in the "Dash-1," the pilot's flight manual.

"We always learn a lot" from such mishaps, Hall said. "In this case, we learned that if he had recycled that (electrical) bus it would have come back."

That procedure was not spelled out in the flight manual, Hall said. It is now.

"We took the emergency apart," 43rd Fighter Squadron commander Lt. Col. Michael Stapleton told The News Herald in a telephone interview. "We determined that the way he responded was perfect."

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As the Raptor training program at Tyndall evolves, and as the aircraft itself matures as the service's frontline fighterbomber, pilots and ground crews will continue to discover unexpected weaknesses and strengths alike in the system, Hall said.

"We're using this plane very differently than they use it at Edwards and Nellis," Hall said, referring to the two Air Force bases where initial flight testing on the Raptor has occurred. "We're actually flying this plane the way it's supposed to be flown."

"These guys learn something new and tell us about it every day," Hall said.

As for Capt. Bartels, both Hall and Stapleton praised the pilot for taking the right action to keep a potentially dangerous in-flight failure from becoming something far more serious.

"He had only 10 hours in the airplane," Stapleton said. "That calls for a lot of airmanship."

Tyndall's parent headquarters, the Air Education and Training Command, agreed. It recently issued Bartels its "Flight Safety Well Done" award for his performance in bringing the malfunctioning Raptor safely back to base.

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